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(54) MOBILE RADIO RECEIVER

(71) We, STANDARD TELEPHONES AND CABLES LIMITED, a British Company, of 190 Strand, London, WC2R 1DU, England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to mobile radio receivers for use in vehicles which are required to receive signals from radiating cables running alongside the vehicle paths.

When a radiating cable is used with a radio base station, for example alongside a motorway, the path loss between a mobile radio receiver and the base station has variations along the length of the cable. These often take the form of standing wave patterns. As a result of these variations there may be significant temporary attenuations of signal in the mobile receiver with corresponding losses of message content.

According to the present invention there is provided a mobile radio receiver arrangement including a pair of co-located antennas having their polar patterns at right angles to one another and both having their null axes horizontal, one of the antennas having its null axis parallel with the direction of motion of the mobile receiver arrangement, a receiver, an oscillator, and switching means operated by the oscillator arranged to connect the two antennas alternately to the receiver input.

An embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Fig. 1 illustrates a mobile radio receiver arrangement,

Fig. 2 illustrates the polar diagrams of the antennas of Fig. 1, and

Fig. 3 illustrates graphically received signal field strengths at the antennas of the receiver in Fig. 1.

The receiver arrangement shown in Fig. 1 comprises two ferrite rod antennas 1, 2 which are connected alternately by a changeover switch 3 to a VHF radio receiver 4. The switch 3 is operated by an oscillator 5, having a frequency in the range 5—20 kHz, and is therefore outside the audio passband of the receiver. This is necessary so that the switching frequency is not heard as a tone superimposed on the wanted message, i.e. speech. The two antennas are co-located at right angles to one another, with both ferrite rods horizontal. The ferrite rod of antenna 1 is positioned parallel to the normal direction of motion of the mobile radio receiver, i.e. parallel to a radiating cable 6 running beside a road 7 when the mobile receiver is in a motor car 8. The polar diagrams of the antennas are as illustrated in Fig. 2. The two antennas 1 and 2 are depicted as single turn loops viewed from above. The respective polar diagrams 1a and 2a are depicted as sections across the centres of the loops.

Fig. 3 illustrates the respective field strengths obtained at two single turn loop antennas each of area 1m² held vertical with their null axes at right angles to one another. The solid line shows the variations in field strength of a loop having its null axis parallel to a radiating cable and the dotted line shows the field strength of the other loop the null axis of which is normal to the cable. The carrier frequency is 4857 kHz and the measurements were performed at a distance of 4.2 metres from the cable. It will be noted that where a significant trough occurs in the field strength for one antenna, e.g. where the received signal level is less than —40 dB above a common reference level, the field strength for the other antenna is generally at a peak. If, therefore, the antennas are alternately switched to a radio receiver input at a high enough frequency the average level of signal fed to the receiver will be maintained above an acceptable minimum level at all times even when the signal level at one antenna is significantly below this minimum level, i.e. the net effect is a form of polar pattern diversity with the path loss never falling more than 3 dB below the weakest component.

WHAT WE CLAIM IS:—

1. A mobile radio receiver arrangement including a pair of co-located antennas

having their polar patterns at right angles to one another and both having their null axes horizontal, one of the antennas having its null axis parallel with the direction of motion of the mobile receiver arrangement, a receiver, an oscillator, and switching means operated by the oscillator arranged to connect the two antennas alternately to the receiver input.

2. A receiver arrangement according to claim 1 wherein the antennas are ferrite rod antennas.

3. A receiver arrangement according to claim 1 or 2 wherein the oscillator frequency is outside the audio pass-band of the receiver.

4. A receiver arrangement according to claim 3 wherein the oscillator frequency is in the range 5—20 kHz.

5. A mobile radio receiver arrangement substantially as herein described with reference to the accompanying drawings.

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1498388 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

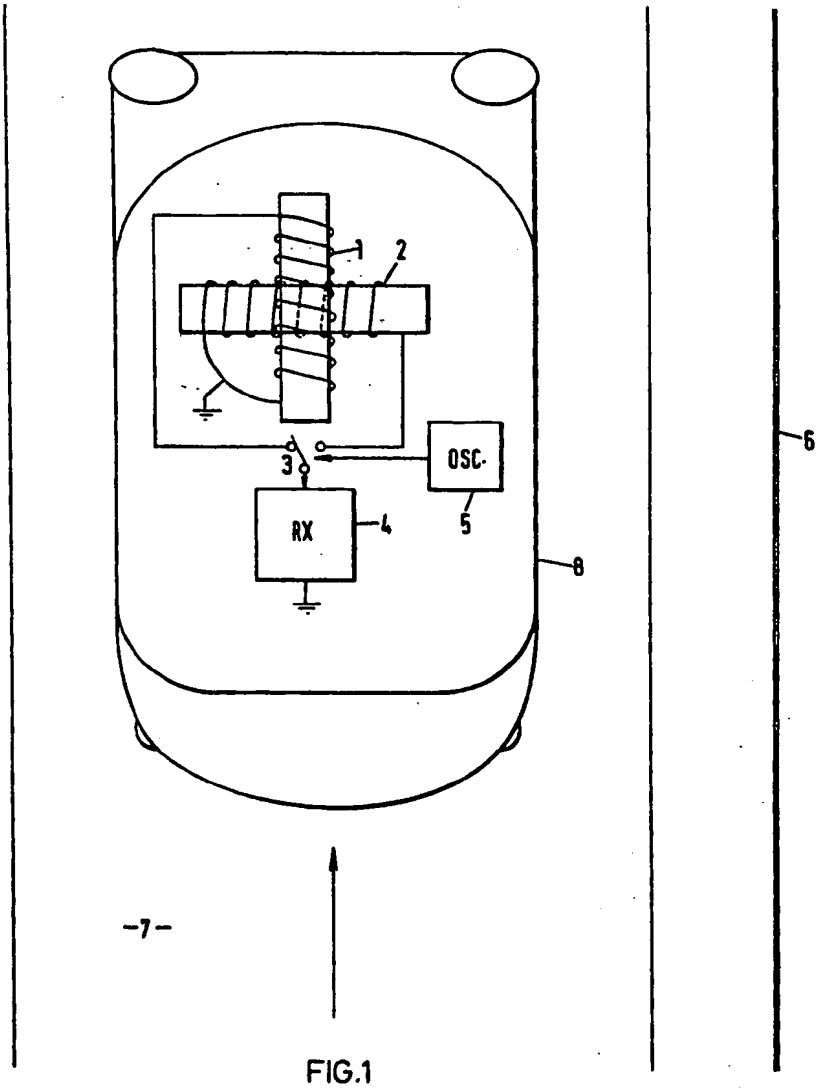

FIG.1

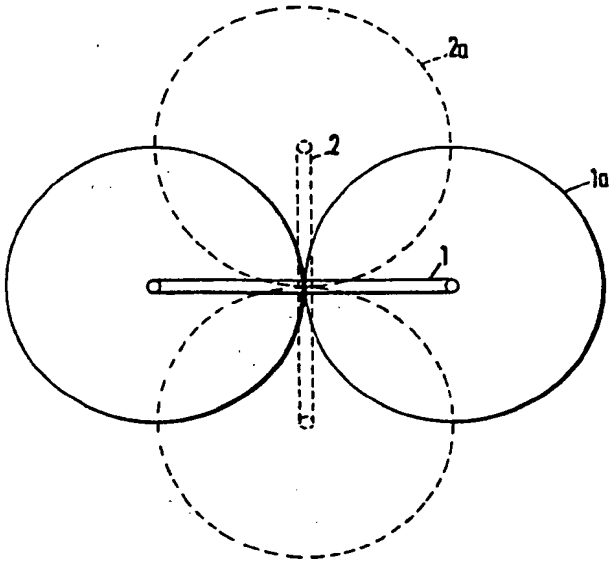

FIG.2

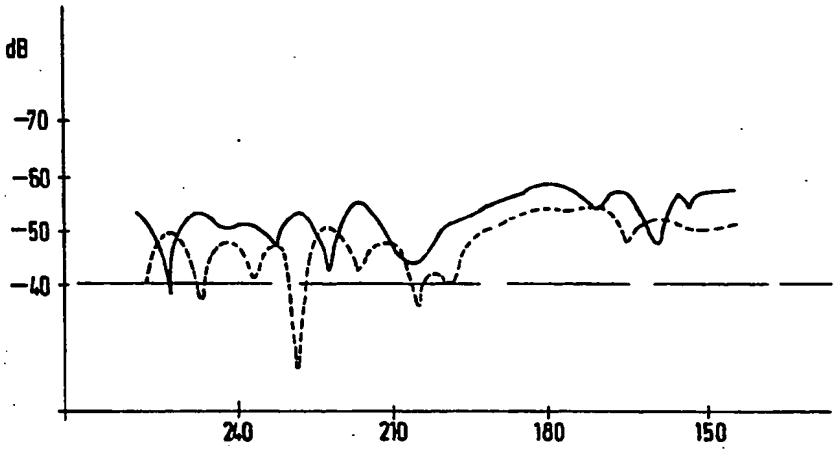

FIG.3